MSTA Newsletter

December 1988
Volume 7 Number 8

Montana Science Teachers Association

Dedicated to Quality Education

Editor Comment: You'll probably notice something different about our Newsletter. Since Doris Simonis left our great state for a position at Kent State, your new Editor-in-Chief is Richard Menger of Baker High School. If there is anything I can do to make your newsletter better, please do not hesitate to criticize or give me suggestions. The typing and formatting is being done on a Macintosh computer with PageMaker software. Above all, if you have something to share with science teachers, please forward it to me at the following address: Richard A Menger, Biology Department, Baker High School, Baker, Montana 59313.

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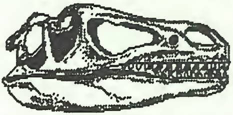
Congratulations to Jim Cusker, biology teacher at Sentinel H.S. in Missoula, who is Montana's 1988 NABT Outstanding Biology Teacher. Jim was recently honored in Chicago at the 50th Anniversary convention of the NABT.



I know my molecules had ancestors. The paleontologist can only hope that his fossils had descendants.

——V Sarich, 1982

American Chemistry Society Olympiad

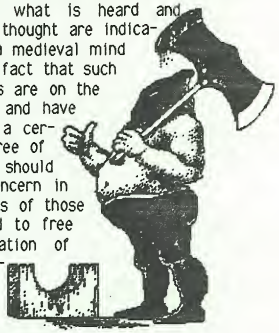
The Montana Section of the American Chemical Society is again sponsoring the U.S. National Chemistry Olympiad(USNCO). The primary goals of this program are to stimulate interest and achievement in chemistry among high school students throughout the United States and to provide recognition of outstanding young chemistry students, teachers, and schools.

Students competing in the USNCO are eligible to be selected as members of the United States team for the Inter-

national Chemistry Olympiad(ICO). For the past five years the U.S. has sent a team of four students to Europe to compete with teams from approximately twenty-five countries in the ICO. The students participate in both theoretical and laboratory examinations over several days. Gold, silver, and bronze medals are awarded to the best performers and the ICO provides students the opportunity to interact with their peers from other countries. This year the international event will be held in Halle, East Germany, from July 2-12, 1989.

The Montana Section encourages you and your students to participate in this program. The identification of the four member U.S. team begins at the local school system level. It is the responsibility of the Montana section to nominate five students from the state to take the National Chemistry Olympiad examination. In order to identify who these students will be, we will again conduct a preliminary exam and from this exam we will select the top 50 students to take the local sectional exam.

Attempts to censor what is read, what is said, what is heard and what is thought are indicative of a medieval mind set. The fact that such activities are on the increase and have attained a certain degree of success should cause concern in the minds of those dedicated to free dissemination of information and ideas.



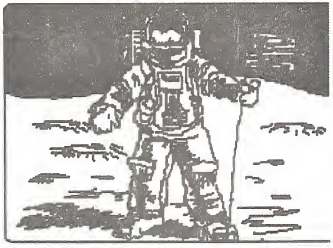
Menger Attends Human Genetics Workshop

From June 20 to July 15, 1988 Richard Menger, biology teacher at Baker High School, attended the last Human Genetics and Bioethical Decision-Making Workshop at Ball State University, Muncie, Indiana. Operated under a NSF grant and directed by Professors Jon Hendrix and Tom Mertens, the goals of the workshop were to UPDATE the participants human genetics knowledge, INTRODUCE methods for implementing bioethical decision-making, INTRODUCE basic theory of bioethics, EXPLORE various teaching methods for human genetics and bioethcial decision-making, PROVIDE participants with as many educational resources as possible for their use as teaching strategies appropriate for their students. Richard is now part of a national network fo teachers. If you wish to find out more about the materials available for genetics at the elementary or secondary level, contact him (Baker High School, Box 659, Baker, Montana 59313).

AVIATION STUDIES OFFERED AT Rocky Mountain College

Beginning this fall, Rocky Mountain College is offering a new course in Aviation Studies. Director of the new program is Ben Diggs.

The Aviation Studies program is dessigned to provide students with the knowledge and skills necessary for a career in the aviatioon industry. Under this program, studeents have the option of specializing in a specific aviatioon studiess elective area, or a double major selected with the advice and approval of the Aviation Studies Program. RMC requires that all students select a minor.

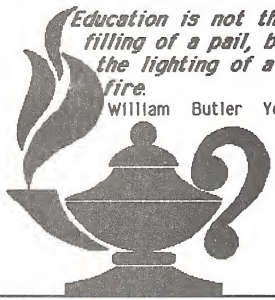


An Aviation Studies graduate is required to have a minimum of an FAA commercial pilot's certificate with instrument and multi-engine ratings. In additio to these requirementss, aviation students must pass an FAA Class III medical examination prior to the private pilot training and an FAA Class II medical examinatioon prior to commercial pilot training.

Students with ratings acquired with college credits must demonstrate proficiency in their most advanced ratings before credits will be accepted to satisfy Rocky Mountain College curriculum requirements. This includes ground school credit as well as flight lab credit. It is the students' obligation to make arrangements to take the appropriate ground school and flight checks. Once a student has enrolled a t RMC, all subsequent flight training must be completed in residence at RMC. Flight training at other schools while students are enrolled at Rocky is not permitted.

Aviation flight costs are not included in basic tuition., Flight costs are computed on an hourly basis for aircraft and flight instruction. These costs are in addition to tuition, college fees, and any other incidental expenses which are normally charged during registration.

MAJOR IN AVIATION STUDIES: A minimun of 41 semester hours in Aviation Studies is required.



Montana Science Teachers Active

The following is just a partial list of the activities that Montana Science Teachers are actively engaged in. If you are involved with any organization or group that promotes science in Montana, please advise.

Montana Science Advisory Council
Jim Cusker
300 Cote Lane
Missoula, MT
549-4449

WMC Science Institute
John Rogan

MT. TECH. Project Partiners Grant
Nina Klein
Montana Tech
Butte, MT 59701

Planetarium Project
Larry Kirkpatrick
Montana State
Bozeman

Museum of the Rockies Planetarium (MOR)
Jim Manning
Larry Kirkpatrick

"Expanding Your Horizons"
Spring Events Girls
Gerry Wheeler

Space Ambassadors
Pat Johnson
Paul Dorance
Helena High
Helena, MT 59601

Science Talent Search
Dave Thomas
MSU

National Geographic's Kidnet Project
Janice Johnson
See Big Sky Telegraph
for details

Science Safety Workshops
Russ Hartford
Gary Freebury
Flathead High School
Kalispell, MT

Goliath Safety Workshop
Gerry Wheeler MSU
Russ Hartford
Flathead High School
Kalispell, MT

Safety Consultant Institute
Russ Hartford
Gary Freebury
Flathead High School
Kalispell, MT

Chemistry Olypiad
Gary Freebury
Russ Hartford
Flathead High School
Kalispell, MT

EAGLE TOURS- Canyon Ferry
Gil Alexander
504 Dearborn
Helena, MT
Each Fall

Helena Science Circus
Ken Price
Helena High School
Spring

Green Jeans Outdoor Classroom Project
Richard A Menger, MST
Biology Department
Baker High School
Baker, Montana 59313
778-3329

Data Acquisition Computer Workshop
John Amend
MSU
Bozeman, Montana 59717

School Earth Science Project
Ray Bauenenger
Tom Zwick
Eastern Montana College
Billings Montana 59101

Montana PSInet
Bob Briggs
Capitol Building
Helena, Montana 59620

National PSInet
Bob Briggs
Capitol Building
Helena, Montana 59620

Egg Mountain Saved new sites opened!
Dave Swingle
MOR

Montana Section AAPT
Len Porter-President
Doug Vulcan Pres. Elect/Spring 89

MESTA
Lee Holmer
603 Willoughby Rd
Stevenssville, MT 59870
777-5281

Project Wild Facilitators Annual Training
Bob Briggs
Vince Yannone
Fish Wildlife & Parks
Helena, MT

Canyon Ferry Science Camp Limnology Institute
Gill Alexander
504 Dearborn Helena
443-2745

U of M Summer Science Institute
David Bilderback
College of Arts & Sciences
243-26332
June 21-July 7 1989

Hands-On-Science at MT TECH In-Service-afterschool/wksp for elementary
Nina Klein
Project Partners
Montana TECH
Butte, MT 59701

NABT Outstanding Biol. Tchr. Award
Craig Kuchel
Florence-Carlton Schl
5540 Old Highway 93
Florence 59833
273-6301

Region II MSTA Science Fair (NMC)
Dave Puyear
Blue Sky School
P.O. Box 129
Rudyard, MT 59540

Science Safety Disk Project
Russ Hartford
Gary Freebury
Flathead H.S.
Kalispell

NAEP representation
Gerry Wheeler

Creepy Caterpillars & other Cosmic Curiosities
Gerry Wheeler

GESSA
Sue Britton
Jeanne Britton
School Dist. #1
Missoula 59801

MSTA Reg. 1 Idea Exchange
Russ Hartford
Flathead H.S.
Kalispell

Yellowstone County Science Fair Sponsered by Deaconess Hospital
Kristy Bick
256-0043

Glacier Institute
Lex Blood
Box 1457
Kalispell, MT 59903

Outdoor Education Workshops
Lex Blood
Box 1457
Kalispell, MT 59903

"Big Creek Outdoor Education Center"
Lex Blood
Box 1457
Kalispell, MT 59903

Glasgow Bridge Building Contest
Gordon Hahn
Glasgow High School
Glasgow, MT

NMC/ Bowdoin WR Outdoor Educ. Program
Evert Pitt
NMC
Havre, MT 59501

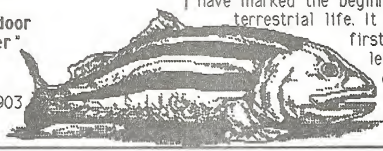
U.S. Physics Team
Larry Kirkpatrick

MSTA-B.E.S.T. GRANT
Richard Micheletto
Bob Briggs
OPI
Helena, MT 59620

New M.E.E.C.
Gary Swant
DeerLodge H.S.

Kalispell Dist. 5 Earth Science Workshop
Lex Blood
Kalispell, MT
FVCC

State Science Olympiad
Gerry Wheeler
MSU
Bozeman, MT 59717

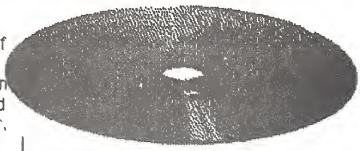


Eusthenopteron: Upper Devonian
The Eustheopteron may very well have marked the beginning of all terrestrial life. It was one of the first vertebrates to leave the ocean over 345 million years ago.

Laserdiscs

A New (and Better) Way to Teach

Richard A Menger, MST



In biology and the life sciences, experience with living things is one of the most important requirements for developing biological understanding. In the physical sciences, the same would hold true for experiences with matter, motion, and forces. Ideally, one would like to have instant access to the appropriate materials, whether living or non-living, and the ability to manipulate them as desired to teach basic principles about them. The laserdisc now makes this possible.

If one thinks of the life and physical sciences as a collection of relatively short-term events, e.g., a bird flying, a cell dividing, molecular motions, or rays of white light refracted by prism, then it should be possible to put together a visual database for these sciences. **Optic Data Corporation** and **Videodiscovery** are just two companies in 1985 and 1986 that have done just that. For example, *Principles of Biology* consists of about 3000 still pictures and 164 motion picture clips that range in length from two seconds to five minutes. Some are narrated while others are not. This one two disk set covers all the main topics presented in introductory biology, is bilingual (Spanish and English), and is probably the most comprehnsive collection of high quality images introduced.

When one combines the ability to still frame or vary the speed backwards or forewards of these clips, then this kind of visual database allows one to teach in a way never before possible. Depending on how one teaches, your students can be given help so they all see a contractile vacuole when they study protists and thereby receive a more detailed understanding of structures and functions . This kind of access should allow teachers to use their own and their student's time more effectively. By looking at phenomena several times, with different perspectives, we should be able to help our students learn to observe and think about what they see and give them a better undstanding of science.

The videodisc player is the ultimate audiovisual machine. It is the only device capable of all the functions of other devices at greater speeds and much better image quality. There are no bulbs to replace, no heads to clean, no tape or film to break or wear out. It is truly the most reliable AV machine.

Film and videotape are not widely used in science classrooms for several important reasons. One of the most difficult limitations is time. If a

teacher has an hour or two to teach about the heart and circulation, it is hard to justify spending 20-30 minutes of that time showing a film, which is often too general. The use of selected portions of motion picture film is awkward without fast forward capabilities. Even the videotape player is cumbersome and the image quality and rapid access are missing.

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How can one use this visual material in the most effective way? Teachers prefer a system which fits into their existing curricula and requires little or no time to learn or use. The visual databases are extremely well-organized and can be used alone or with software and an Apple computer. Programs are available in earth, life, physical, and space sciences.

When a computer is linked to a videodisc player, interactive instruction can be developed easily with new authoring programs that allow true-false, matching, multiple-choice, and fill-in questions that correspond to visual data. The best programs can simulate real situations and provide feedback so students can learn from their own decisions and experience.

By using the best living or other lab materials and the best AV materials together, teachers can concentrate more on teaching the principles of their respective science and to create more undertsanding.

Screenee's Dillemma

Tell me why you people screen?
Do you screen to intervene?
Is it merely to be mean?
Or just to find a mutant gene?
Tell me, will you if it's true
That screening's good for PKU.
Though it's smart to test for
tuberculosis
Does it make sense in cystic fibrosis?
You say you can treat galactosemia
But how about people with sickle cell
anemia?
Sickle cell trait you're finding in
Blacks
Some tests show that Jews carry
genes for Tay Sachs.
Why didn't you tell me that this kind
of test
Might change my life into one holy
mess!
I now feel like I'm second rate
I'm even scared to have a date.
It's true I have a gene mutation
But so's everybody in creation.
Mutations help us to survive
So don't hand me that inferior jive.
Some day we'll each one wear a sign
Saying, that's your mutation and this
is mine!
So don't screen me until your sure
The doctor's got a perfect cure!
Or else you really think you could
Change that gene from bad to good!

R.F. Murray, Jr., M.D.
February, 1975

Pass out holed-punched screening cards and indicate that you are looking for a mate! Put various genetic diseases on the punch cards.

Motivational Research Study
of
The Learn-to-Fly Program

Commisioned by
THE CESSNA AIRCRAFT COMPANY

MODERN COMMUNICATIONS

The Modern Style of Young People

There are several pitfalls that should be avoided when addressing today's young adults. First, mimicry of teen-age vocabulary could bring about negative reactions– and the feeling that the industry is an "outsider" that doesn't really understnd this new generation's jargon. Second, certain psychological concepts associated with the older generation – such as fllying being a peak experience in life or a luxury pursuit – should also be avoided. Third, to treat flying lessons as a major decision will most likely encourage postponeement. Instead, a more casual approach is needed – one which will reflect the psychological language of today's young American.

To effectively communicate with people in the age group 16-29, it will be necessary to use a form of "understatement," that is, to display a type of quiet excitement or emotion. The life style of today's young adult is to gloss over sentimental displays of emotion.

These young people need to learn about flying in a language that will minimize embarrassment and take the aviation industry down from its inaccessible pedestal.

A Neat Elementary Observing Activity

Kristy Bick
MSTA

Class of 20 in groups of 5.

Supply: Warm Water (110-115 F)
4 packets of dry yeast.
12 teaspoons of sugar
4 plastic cups
Thermometer

Experiment: Divide class into group of 5 students.
Give each group: Plastic cup with 1/2 cup of warm water
3 teaspoons of sugar
1 packet of yeast

Have them use a thermometer to check degree temperature. Have them put yeast into water. Tell them that yeast is a plant -however it isn't a green plant and it doesn't make it's own food. The sugar is then added -this provides food for the yeast. The change of the water with yeast and sugar is an excellent observing activity. Have them record what they observed and share their results.(They will see expanding bubbling foam.)

How to Plant Seedlings*

Introduction: **The purpose of this module is to assist you in developing the skills needed to plant a variety of seeds and obtain 6-8 healthy seedlings from every 10 seeds you plant.**

Materials:

vermiculite peat moss
sterile potting soil
coarse builder's sand
kitchen sieve (coarse mesh)
potting flats, 6 x 25 x 40 cm
sand paper, medium grit
wooden plant markers
plastic buckets, 8 liter
fiberglas sheets to cover flats
Seeds: bean zinnia
sweet white clover
moonflower plum pits or
apple seeds

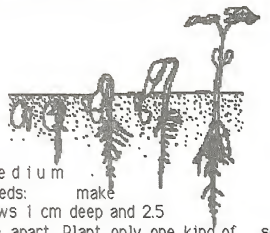
Procedure:

1. Mix in a 8 liter plastic bucket (2 gallons) equal portions of vermiculite, peat moss, and potting soil. Always use volume, not weight measurements.

2. Pour the soil in the plant tray whose dimensions are 6 x 25 x 40 cm. Smooth the surface of the soil until it is level. Leave at least 2 cm of the tray unfilled.

3. There are two methods for planting seeds: drill and scatter. With either method, the orientation of the seed is not critical.

4. Drill Method Large Seeds: using the edge of a ruler make the rows 1.5 cm deep and about 5 cm apart. Drill Method



Medium Seeds: make rows 1 cm deep and 2.5 cm apart. Plant only one kind of seedling per tray.

5. Using the tray prepared for large seeds place the bean seeds in the drills 5 cm apart and 2.5 cm deep. Cover the completing drills with planting mixture.

6. Place medium seeds like zinnia in the drill 2.5 cm apart and 1 cm deep. Cover the drill as before.

7. Scatter Method Large Seeds: after scattering the bean seeds about 2.5 cm apart, cover the seeds with about 2.5 cm soil mixture. *A good general rule is to cover seeds 2-3 times their diameter.*

8. Scatter Method Fine Seeds: seeds like sweet marjoram should be mixed in a container with sand at a 1:5 ratio. The mixture is placed in a sieve and shakened evenly over the soil in the tray. In this procedure you do not cover the scattered seed with additional soil.

9. Certain seeds require special treatment for germination to take place. Examples are seeds with hard waxy coats that are impermeable to water and gas, and seeds with special environmental requirements, such as a cold period. Review anatomy of a seed (seed coat, endosperm, embryo, and hilum).

10. Moonflower requires abrasion with medium grit sand paper at the opposite end of the hilum. Be careful not to dam-

age the interior of the seed.

11. Sweet White Clover requires abraiding with sand. This is done by mixing equal portions of sand and seed and rubbing the seed and sand between your hands. Then plant these seeds using the sieve technique described earlier.

12. Plum (peach, aprocot, or cherry) require special environmental conditions before they germinate. A cold period of between 120-130 days is sufficient. The pits must be cleaned thoroughly first with a small scrub brush and running water. Arrange the pits in a container of at least 10 cm depth on moist peat moss 2.5 cm in depth and cover with 2.5 cm of peat moss. Keep moist, but not wet.

13. Be sure to identify the dish with the number of seeds and the date and kind.

14. After about 120 days plant the pits in a soil mixture of equal portions of peat moss, potting soil and coarse builder's sand, and one half portion of vermiculite. Plant each seed 2.5 cm deep in a 5 inch pot.

15. None of the seed trays mentioned should be placed in direct sunlight, and should be covered with a transluscent material until shoots are visible.

16. The germination times of the seeds used here are given for your reference:

White Clover....4 to 7 days
Large Beans.....3 to 5 days
Zinnia.....7 days
Moonflower....7 to 10 days
Plum.....12 to 20 days

17. Each day rotate the trays 180° to the light. This will cause the seedlings to grow straight. The the trays moist, but not wet.

18. When the true leaves appear, the seedlings are ready for transplanting.

It is important to realize that the seeds used here are general examples of large, medium, small, and special condition seeds and any techniques can be applied to other seeds of similar size or growing condition.

In succeeding newsletters, I'll go over how to transplant seedlings into flats, how to transplant seedlings from flats to pots, how to fertilize greenhouse plants, and many more! Start collecting them for home or student use.

***Adapted from the American Institute of Biological Sciences, Project Bioteck, 1974.**

Richard A Menger, MST
Green Jeans Horticulture
Outdoor Classroom Project
Baker High School

Science is limited in what it can tell us and we are limited in what we can know. But one of the most important things science can tell us is the limits of the world within which we are free to act. Only in the recognition of limits does science lead us to wisdom.

CURRENT STATISTICS

MONTANA AIDS CASES
Demographic Summary as of 9/15/88

CASES			SEX		
Reported Cases	23	100%	Female	3	13%
Reported Death	13	57%	Male	20	87%
				23	100%
AGE			RISK FACTOR		
Less than 5	0	0%	Homosexual/Bisexual Male	12	52%
5-12	0	0%	IV Drug Abuser	3	13%
13-19	0	0%	Homosexual Male & IVDA	2	9%
20-29	6	26%	Homophilia, etc.	2	9%
30-39	12	52%	Heterosexual	3	13%
40-49	4	17%	Transfusion	0	0%
Over 49	1	4%	No Identified Risk(NIR)	1	4%
	23	100%			
RACIAL/ETHNIC GROUP			COUNTY OF DIAGNOSIS		
White	19	83%	Cascade	8	35%
American Indian	1	4%	Gallatin	1	4%
Black	1	4%	Lewis and Clark	1	4%
Hispanic	2	9%	Missoula	4	17%
Other/Unknown	0	0%	Silver Bow	1	4%
	23	100%	Yellowstone	5	22%
			Out-of-State Diagnosis	3	13%
				23	100%

Source: Montana AIDS Program, MDHES, September 1988.

Note: There are two (2) other AIDS cases living in Montana which have been reported to MDHES. These were diagnosed and reported to Centers for Disease Control from other states. Those demographics are not included above.

As of September 30, 1988 there have been 167 positive HIV tests from 11,913 tests conducted through the DHES Public Health Laboratory.

HOW KIDS THINK
MILESTONES IN CHILD DEVELOPMENT

Studies of language development in infants and young children focus on *receptive* (that which is understood by the child) and *expressive* (that which the child uses) language. It is important to remember that the ages associated with each milestone represent averages. Variation from child to child are to be expected.

3 months:
- ◇ starts babbling
- ◇ uses mostly vowel sounds

6 months:
- ◇ vocalizes for pleasure
- ◇ babbling continues
- ◇ turns and looks toward sound of human voice

9 months:
- ◇ may say "mama" or "dada"
- ◇ vocalizes double consonants (ba ba, ta ta)

12 months
- ◇ imitates syllables and some words
- ◇ knows one to two words plus mama and dada
- ◇ understands "no"
- ◇ understands simple directions (gives toys on request)
- ◇ uses invented words

18 months:
- ◇ knows ten to twenty words
- ◇ uses one-word and two-word phrases accompanied by gestures to convey information
- ◇ may combine two works into sentences (more juice)
- ◇ points to simple pictures
- ◇ asks "what's that?"
- ◇ tries to sing songs with words.

24 months (2 years)
- ◇ 50-250 word vocabulary
- ◇ uses two- to three-word
- ◇ speaks in longer sentences
- ◇ talks to self while playing

36 months (3 years)
- ◇ 800-1000 word vocabulary
- ◇ uses words to convey ideas
- ◇ knows name, sex, several rhymes or stories
- ◇ able to follow simple instructions and remember them
- ◇ understands concepts such as yesterday, summer, big and little
- ◇ asks "why?"

48 months (4 years)
- ◇ 1500-2000 words vocabulary
- ◇ speaks in four to five work sentences
- ◇ asks questions
- ◇ can recall or give account of a recent experience
- ◇ points to colors and shapes
- ◇ syntax of language in place

60 months (5 years)
- ◇ 2000 + word vocabulary
- ◇ speaks in conversations with adults
- ◇ uses future tense
- ◇ knows most common opposites
- ◇ follows three-step commands
- ◇ tells elaborate stories

72 month (6 years)
- ◇ uses 2600 + words
- ◇ speaks fluently in complex sentences
- ◇ understands jokes and riddles
- ◇ reads simple words by end of first grade
- ◇ has absorbed rules of grammar and sentence structure
- ◇ asks meaning of new words.

If youth is the season of hope, it is often so only in the sense that our elders are hopeful about us.

— George Eliot

POSITION STATEMENT

SCIENCE CREDIT FOR VOCATIONAL COURSES

The following statement is the position taken by the Montana Science Advisory Council and MSTA Board of Directors.

The proposal to consider granting science credit for vocational courses has serious consequences for high school students statewide. We strongly urge that administrators consult science education experts within the state before reaching such a far reaching decision.

The student's experience in a science classroom is more than memorizing and applying a collection of discrete bits of information. Science is a search for understanding . To build understanding, students are taught to look for unexplained behavior in nature, design experiments which will yield information concerning this behavior, and then collect and organize this information to determine cause and effect relationships. These scientific skills are critical to survival in a technological society, but technological skills do not substitute for scientific process skills.

Science is a creative process used to investigate natural phenomena, resulting in the formation of verifiable theories by direct observations. These theories are challengable and changeable. The data used to support or contradict them must be reproducible.. The investigative processes of science use a systematic procedure that consists of identifying the problem, gathering pertinent data, formulating a hypothesis, performing experiments, interpreting the results and drawing conclusions. Biology, earth science, physics and chemistry are the basic natural sciences.

Vocational courses do not meet these requirements. They are technology. Technology uses and depends upon science, but is not science. Analogously, although algebraic principles and concepts are used in chemistry, the course is clearly not a math course. In the chemistry course, math is a tool just as science is a tool in an electronics course. Many courses taught in secondary schools have science content in their delivery but that does not make them science courses.

We, members of the **Montana Science Advisory Council** and **MSTA Board of Directors**, unanimously and urgently recommend that vocational courses not be granted science status. Vocational courses are not science. They do not meet the definition of science, nor do they meet the requirements of the Montana College Preparatory Program or the philosophy of Project Excellence. The substitution of vocational courses for science courses is not adequate to meet the general education needs of any student. They do not meet the requirements of the state or national scientific community.

Written and submitted November 1988

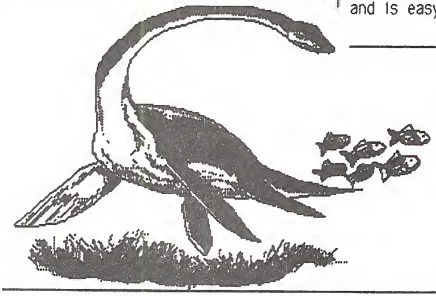
EARTH SCIENCE EDUCATION

The *Importance of Earth Science Education* is a statement that advocates the study of earth science education in grades K-12. Approved and endorsed by the National Earth Science Teacher Association, the NSTA, the Council for Elementary Science International, the National Association of Geology Teachers, and the American Geological Institute the statement stresses why earth science education is vital "for the development of an informed citizenry." It says, "If tomorrow's adults are to make wise decisions about Earth and environmental issues, it is vital that today's students be given the opportunity to study Earth Science at all levels as an integral part of their education as well as an invaluable part of their high school experience."

For more information, and copies of the statement contact Frank Ireton, P.O. Box 53314, Washington DC 20009, or Dr. H. Stonehouse, c/o Science Department, Lansing Community College, Lansing, Mi 48901.

CALCULATORS IN SCIENCE

The Associated Press reports that calculators have been distributed to all 167,000 fourth through eighth graders in the Chicago school system. Although still a controversial issue, the use of the calculator in the elementary classroom is definitely on the increase. How about including it in elementary science activities as well as to make the connection between math and science more concrete to our younger kids? An activity that comes to mind has the kids find circular patterns outside a bird's nest, a daisy, a cross-section of a tree branch, even a man-hole cover. Measure both circumference and diameter, divide using the calculator and determine the relationship between the two. This would be tedious work with paper and pencil but it becomes an interesting exploration using the calculator to do the work. Although we don't expect perfect accuracy, the kids should be able to develop a theory and use it to predict either circumference or diameter if the other is known. This activity involves many process skills and is easy enough to carry out.

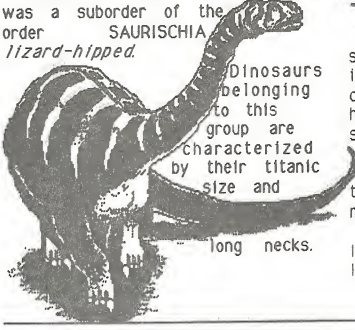


order:
EURYAPSIDIA
family:
PLESIOSAURIDAE
genus:
ELASMOSAURUS
carnivore, marine (fish-eater)
Cretaceous

WHY STUDENTS FAIL IN SCIENCE

One reason that American science students do not compare successfully with their counterparts in other countries is that few students actually do science in this country. Bob Tinker, director of the Technical Education Research Center in Cambridge, Ma, has said that the unfortunate tendency of states, boards of education, and schools to demand better achievement in science has resulted in more hours spent in encyclopedic textbook-based courses and more tests. Our students do not get to do science. We need to get students "actively involved," he said, "in a creative and controlled way, and then they'll learn like wildfire".

One way to help students do science is to take advantage of local hand-on science museums. Another way is to involve students in local, state and national science fairs, symposia and contests.



An easy and simple way to observe large, live insects is through an insectorium. The insectorium is a clear plastic bag containing small air holes. The open end of the bag is stapled closed. Individual insects captured in the field can be kept alive for days and be observed through the bag with a dissecting microscope in the laboratory.

Irwin Talesnick, *The Idea Collection* , Idea 175, 1984

THE YELLOWSTONE FIRES: WHAT REALLY HAPPENED AND WHAT DOES IT MEAN?

What really happened at Yellowstone National Park this summer? The National Park Service is offering a "primer" on the 1988 fires to answer that question. The report puts the fires into an historical contest, explores the role of fire in Yellowstone's wilderness ecosystem, discusses why the fires burned so extensively, tells what was done to fight them, and reviews likely ecological consequences.

Science teachers may obtain a copy of the report, "The Yellowstone Fires: A Primer on the 1988 Fire Season," free of charge. Write to:

Yellowstone Fire Primer
Division of Interpretation
Nation Park Service
P.O. Box 168
Yellowstone National Park, Wyoming
82190

Those who write for a copy will also be placed on a mailing list. As continuing research finds out more about the fires, those on the mailing list will receive the new information.

It is best to do things systematically, since we are only human, and disorder is our worst enemy.

——— Hesiod

NEW ELEMENTARY SCIENCE MAGAZINES

Scholastic, Inc. announced at the 1988 NSTA National Convention its plans to publish two new elementary science magazines under a program entitled *SuperScience* , beginning in the 1989-90 academic year.

Scholastic, Inc. publishes books, classroom magazines, software, and teaching materials. Prior to this program Scholastic produced materials mainly for the language arts, with the exceptions of Science World and Study Science magazines.

SuperScience will include a 32 page monthly magazine for students in grades 4-5, and a four page weekly magazine for students in grades 1-3. In addition, *SuperScience* will provide elementary educators with comprehensive teaching materials and an annual software program offering a computer learning component to the curriculum. The classroom magazine and materials will focus on a broad range of areas in the science curriculum including earth, life, space, and physical science, as well as health, medicine, and technology. High-interest graphs and diagrams, activities and experiments, games and puzzles will emphasize the development of science program-solving skills through hands-on experiences.

For more information contact:
Molly Doyle (212) 505-3561
Scholastic Inc.
730 Broadway
New York, New York 10003

Scientific Method: It Starts with a Question

1. Can you list the steps of the scientific method?
2. Why is the form of the question being asked important? What limits must be placed upon the question?
3. How is the hypothesis different from the question?
4. In designing an experiment, what are variables? Give examples. How many variables can be tested in each experiment? Why is this important?
5. What is the control group in an experiment? Why is this group important?
6. Can you list and discuss ways in which observations can be made? (Be sure that the students are aware that all senses can make observations.)
7. What is the difference between the conclusion and a theory?
8. Once a conclusion is tested by many scientists and all obtain the same results, a theory or model is established. Discuss the statement, "Once a theory, always a theory." Give examples to illustrate your answer.

The strongest principle of growth lies in human choice.

——— George Eliot

MSTA AWARDS PROGRAM

One of the goals of the Montana Science Teachers Association is to promote good science education in Montana. To enhance this effort, the MSTA is sponsoring an awards program to recognize outstanding teachers of science at every level thoughout the state.

Three awards will be given in each of the six regions of the state: one for elementary level teachers, one for middle school/junior high level teachers, and one for high school level teachers.

The awards presentations will be maade during the MSTA banquet during the MSTA Conference.

During a special sectional during the 1989 MSTA Conference in Great Falls each award winner will be asked to make a 20-minute presentation explaining his/her favorite unit, lab, or activity.

Those who wish to nominate a colleague, themselves, or someone they supervise may do so by requesting an application form for the awards from their regional director. The directors will send application forms to the nominees explaining eligibility, procedure and deadlines.

The regional directors are:

Russ Hartford
MSTA Director, Region I
74 Sussex Dr.
Kalispell, MT 59901

David Puyear
MSTA Director, Region II
Box 113
Rudyard, MT 59540

Steve Schumacher
MSTA Director, Region III
Box 1121
Malta, MT 59538

Myra Miller
MSTA,Director, Region IV
1115 S Willson
Bozeman, MT 559715

Linda Robinson
MSTA Director, Region V
4408 Pine Cove
Billings, MT 59101

Richard Menger
MSTA Director, Region VI
Baker High School
Baker, MT 59313

MONTANA JUNIOR ACADEMY OF SCIENCE
RESEARCH PAPER APPLICATION AND REQUEST FOR MJAS MEMBERSHIP

Student's Name _____

Teacher/Advisor's Name _____

High School _____ Year in School _____

School Address _____

Title of Paper _____

_____

_____

_____ _____
Student's Signature Teacher/Advisor's Signature

Attach this form to the research paper and submit by January 15 to the V.P. of the sectional checked below. Include a check payable to MAS for 1989 membership. $5.00

_____ BIOLOGICAL SCIENCES
Don Despain, Box 168, Yellowstone Park, WY 83190

_____ ENVIRONMENTAL SCIENCES AND ENGINEERING
Howard Peavy, Mont. State Univ. , Dept. of Civil Eng.
Bozeman, MT 59717

_____ MATHEMATICS, STATISTICS AND COMPUTER SCIENCE
J. Denbigh Starkey, Mont. State Univ., Dept. of
Computer Science, Bozeman, MT 59717

_____ MICROBIOLOGY
Jean Starkey, Mont. State Univ., Dept. of Microbiology
Bozeman, MT 59717

_____ PHARMACEUTICAL AND TOXICOLOGICAL SCIENCE
Charles Eyer, Univ. of Mont., School of Pharmacy
Missoula, MT 59812

_____ PHYSICAL SCIENCES
Hugo Schmidt, Mont. State Univ., Dept. of Physics
Bozeman, MT 59717

_____ SOCIAL SCIENCES
George Waring, Mont. Tech., Humanities and Social
Sciences, Butte, MT 59701

(DO NOT WRITE BELOW. FOR OFFICIAL USE ONLY)
SELECTION COMMITTEE EVALUATION
Value from 1 (low) to 10 (high)

1. Researchable question . . . . . _____
2. Literature review . . . . . _____
3. Research design . . . . . _____
4. Experimentation . . . . . _____
5. Data and/or results . . . . . _____
6. Conclusions . . . . . _____
7. Visuals, graphs, etc. . . . . _____
8. Clarity and completeness. . . . . _____
9. English usage . . . . . _____
10. Presentation, neatness. . . . . _____

Total _____

c. MJAS Sectional (P.M. session)

1) Presentation of abstracts of all invited MJAS papers.

2) Poster session.

3) Certificates of Achievement awarded to all presenters.

4) Announcement of overall top paper and alternates.

SUMMARY OF 1988 MJAS PROGRAM

1. Thirty nine students representing twelve high schools submitted research papers.

2. Papers selected for presentation by section.

No.	Section
2	Biological Science
0	Environmental Science and Engineering
1	Mathematics, statistics, computors
4	Microbiology
2	Pharmaceutical and toxicological science
3	Physical Sciences
1	Social Sciences
13	Total

3. Grand award winners in research paper competition:

Allene Whitney, Captial HighSchool, Helena
Cort Reithal, Big Sky High School, Missoula
Ryan Hawk, Sentinel High School, Missoula
Robert Rudoff, Sentinel High School, Missoula

4. Allene Whitney, the author of the top paper, will attend the annual meeting of the National Jr. Academy of Science in San Francisco, and present a report of her research.

INSTRUCTIONS FOR PARTICIPATION

1. Science teachers are requested to contact potentially interested students immediately concerning this program.

2. For each participant, the following must be sent to the appropriate sectional vice-president so as to arrive no later than January 15, 1989.

a. Completed entry/membership form.

b. A check made out to MAS for student membership (the fee includes a copy of the annual proceedings).

c. A research paper authored by the student.

3. For additional information, contact Jim Cusker, MJr.AS sectional vice-president, Sentinel High School, Missoula, MT 59801 - 728-2403 OR 549-4449.

THE MONTANA JUNIOR ACADEMY OF SCIENCE

INTRODUCTION

The Junior Academy of Science program offers high school students the unique opportunity of presenting the results of their research using the same methods and in exactly the same setting as that provided practicing scientists. The Montana Academy of Science (MAS) has established a chapter of the Junior Academy and encourages high school students to submit papers for possible presentation at the yearly MAS annual meeting. Students submitting outstanding papers will be invited to present them at the regular sectional of the Junior Academy. The author of the top paper will be invited to present his/her paper at the annual meeting of the National Junior Academy of Science the following winter. Both MAS and the Montana Science Teachers Association (MSTA) have agreed to assist in the funding of this program. All students who submit a paper for consideration will be given a certificate by MAS. An abstract of all papers presented will be published in the annual MAS Proceedings which is mailed to all Junior Academy members. Those not selected to present their papers at the annual meeting will be invited to participate in a poster display of their projects. All junior members are encouraged to attend the regular morning sectionals to hear papers presented by our Montana scientists.

THE CALL FOR PAPERS

a. Participants - high school students who have completed a science research project.

b. Send Papers To - The Sectional Vice-President of the appropriate subject matter area.

c. Deadline for Papers - January 15, 1989.

d. Participation for Members Only - include a student membership fee with the form letter accompanying each student paper.

THE SELECTION PROCESS

The MAS vice-presidents will select one or more papers submitted by Junior Academy members and will schedule their presentation for a morning session of their sectional. All papers reviewed will be returned to the MAS Junior Academy sectional vice-president who will 1) send all papers scheduled for presentation to a final committee of scientists who will select the top paper and two alternates, 2) notify the students who will present papers and request that they submit an abstract of their work for publication, 3) send certificates of achievement to all non-presenting students and invite them to participate in a poster session at the annual meeting.

THE MAS ANNUAL MEETING

a. On the campus of Montana State University.

b. Regular MAS sectionals (A.M. sessions) - Paper presentations by practicing scientists to include junior members designated by the above process. Everyone is encouraged to attend as many presentations as possible.

Mount Saint Helens Project

The Mount St. Helens Project is housed at Portland State University and operates under a grant from the National Science Foundation. The Project selects 30 exceptional secondary science teachers to attend a workshop: **A Model for Studying Natural Phenomena Using Mount St. Helens** . The program deals with volcanic development, types of eruptions, plate tectonics, volcano monitoring, and hazards created by volcanoes and other related structures. Workshop time is split between and classroom and field work.

The Mount St. helens Project is the ultimate field experience for a science teacher. Field work includes visits to Mt. Rainier, Mt. St. Helens, Mt. Hood, the Columbia River Gorge, Newberry Crater, and Crater Lake. A highlight is a helicopter trip into and the exploration of the crater of Mt. St. Helens. The workshop provides the opportunity for firsthand stories and memories to be shared with students and other teachers. Teachers not only bring back slides and photographs, but are given software, texts, and videos for use in the classroom, local universities and other schools. They will also receive a quarterly newsletter from the Project with photos and articles.

Participants will develop instructional materials during and after the workshop for use in their classrooms. Round-trip airfare, a stipend, field-trip transportation, and tuition for 6 quarter hours are included in the workshop.

Applications for the 1989 **A Model for Studying Natural Phenomena Using Mount St. Helens** summer workshop will be available starting in January. The workshop is conducted cooperatively by the School of Education and Geology Department at Portland State University in Portland, Oregon.

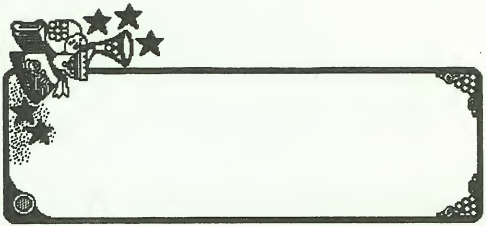
Thirty participants will be selected from throughout the nation to attend the August 6-19 workshop in Portland. All secondary level science teachers with at least three years of teaching experience are eligible to apply. During a combination of classroom and field study, participants will explore the evolution, behavior and unique hazards associated with Cascade Range volcanoes, featuring Mount St. Helens.

For application forms and information, contact David C Cox, Mount St. Helens Project, School of Education, Portland State University, Box 751, Portland, Oregon 97207-0751. Completd applications must be received by March 15, 1989.

Education, in the deepest sense, is continuous and lifelong and in essence unfinishable.

—— James Hilton

Postage



Montana Science Teachers Association

MSTA will help the individual participate in determing the destiny of science in Montana. The organization serves as a vehicle for educators from all professions to exert positive influences on young people. Many important decisions concerning the scope and direction of science education will be strongly influenced by our organization.

MSTA goals are to increase public awareness, interest and support of science education in Montana.

MSTA

Dedicated to Quality Education

Membership Category:	
1 year	$ 10.00
2 years	$ 17.00
3 years	$ 24.00
Life	$100.00
Student/Retired	$ 3.00

Membreship dues are $8.00 and are payable to Gil Alexander, Tresurer, Helena High School, Helena, Montana 59601. Membership includes a one-year subscription (4 issues) to *The Montana Science Teacher* .